

WHAT IS CLAIMED IS:

1. A heat shield comprising a first metallic outer layer, a second metallic outer layer, and a foam layer disposed in between said first and second metallic outer layers, said first metallic outer layer having a thickness of 0.001-0.02 inches.
2. A heat shield according to claim 1, said first and second metallic outer layers having substantially the same thickness.
3. A heat shield according to claim 1, said first and second metallic outer layers being made from the same metal or metal alloy.
4. A heat shield according to claim 1, said foam being effective to withstand operative heat shield temperatures of at least 1000°F, and to dampen acoustic tonal frequencies below 2000 Hz.
5. A heat shield according to claim 4, said foam comprising polyurethane foam.
6. A heat shield according to claim 4, said foam layer comprising a substantially rigid polyurethane foam that is sufficiently pliant to be bent to and accommodate a particular shape and contour to which the heat shield is to be bent and to generally conform in use, without substantially damaging the cellular structure of the foam as a result of such bending, said polyurethane foam being reversibly deflectable from the force of an impacting acoustical wave to a sufficient extent to absorb or redirect a portion of the wave's acoustical energy.
7. A heat shield according to claim 1, said foam being a semi-rigid viscoelastic foam.
8. A heat shield according to claim 1, said foam being deformable to accommodate a particular shape and contour to which the heat shield is to be bent and to generally conform in use, without substantially damaging the cellular structure of the foam as a result of such deformation.

9. A heat shield according to claim 1, said foam being reversibly deflectable from the force of an impacting acoustical wave to a sufficient extent to absorb or redirect a portion of the wave's acoustical energy.

10. A heat shield according to claim 1, said foam being a substantially rigid foam that is reversibly deflectable from the force of an impacting acoustical wave to a sufficient extent to absorb or redirect a portion of the wave's acoustical energy.

11. A heat shield according to claim 10, said foam being at least 95 percent recoverable from an acoustical deflection.

12. A heat shield according to claim 1, said foam layer having a thickness of 0.005-0.75 inches.

13. A heat shield according to claim 1, said foam layer having a thickness of 0.15-0.17 inches.

14. A heat shield according to claim 1, said foam layer being made as an expanded foam layer between the first and second metallic outer layers, such that the foam layer is adhesively bonded to adjacent surfaces of the respective first and second metallic outer layers without a separate adhesive or adhesive layer.

15. A heat shield according to claim 1, further comprising a porous material layer embedded within said foam layer.

16. A heat shield according to claim 15, said porous material layer being a fiber mat being made from non-woven fibers.

17. A heat shield according to claim 16, said fibers being polypropylene fibers.

18. A heat shield according to claim 15, said porous material layer being spaced substantially equidistant from the first and second metallic outer layers, and having a thickness of about 2-2.5 mm.

19. A heat shield according to claim 1, further comprising an absorber layer comprising fluffy fibers laminated to the second metallic outer layer opposite the foam layer, said absorber layer having a thickness of about 1/4 to 1/2 inch.

20. A heat shield according to claim 19, said absorber layer comprising polyester fluffy fibers, polyethylene fluffy fibers, or a mixture thereof.

21. A heat shield according to claim 1, said foam layer being made from an expandable foaming composition comprising 10-40 weight percent of a first polyol, 20-50 weight percent of a second polyol, 5-20 weight percent isocyanate excluding the weight of the molecule(s) to which the isocyanate groups are attached, 0-0.5 weight percent tin catalyst, 0.2-2 weight percent amine catalyst, 0-2.5 weight percent surfactant, and 0.1-5 weight percent foaming agent, wherein the first polyol has a molecular weight of 200-600 and a hydroxyl number of 200-600, and the second polyol has a molecular weight of 2000-8000 and a hydroxyl number of 10-200.

22. A heat shield according to claim 21, said first and second polyols being sucrose-based and glycerin-based polyols respectively.

23. A heat shield according to claim 21, said isocyanate being provided in the form of an allophanate-modified diphenylmethanediisocyanate.

24. A heat shield comprising a metallic outer layer, a semi-rigid foam layer made from a first foam material adhered to said metallic outer layer, and a foam layer absorber made from a second foam material, dissimilar to the first foam material, adhered to said semi-rigid foam layer opposite the metallic outer layer.

25. A heat shield according to claim 24, said metallic outer layer being an aluminum layer having a thickness of 0.001-0.02 inches, said semi-rigid foam layer being a polyurethane foam layer having a thickness of 0.005-0.75 inches, and said foam layer absorber being a closed cell foam layer having a thickness of about 1/4 to 1/2 inch.

26. A heat shield according to claim 24, said foam layer absorber being a closed cell polyvinyl nitrile foam layer.

27. An automobile body panel having the heat shield of claim 1 fastened or mounted to the body panel.

28. An automobile body panel according to claim 27, said foam being effective to withstand operative heat shield temperatures of at least 1000°F, and to dampen acoustic tonal frequencies below 2000 Hz.

29. An automobile body panel according to claim 27, said foam being a substantially rigid polyurethane foam that is sufficiently pliant to be bent to and accommodate a particular shape and contour to which the heat shield is to be bent and to generally conform in use, without substantially damaging the cellular structure of the foam as a result of such bending, said polyurethane foam being reversibly deflectable from the force of an impacting acoustical wave to a sufficient extent to absorb or redirect a portion of the wave's acoustical energy.

30. An automobile body panel according to claim 29, said foam being at least 95 percent recoverable from an acoustical deflection.

31. An automobile body panel according to claim 27, said foam layer having a thickness of 0.005-0.75 inches.

32. An automobile body panel according to claim 27, said foam layer being made as an expanded foam layer between the first and second metallic outer layers, such that the foam layer is adhesively bonded to adjacent surfaces of the respective first and second metallic outer layers without a separate adhesive or adhesive layer.

33. A heat shield according to claim 1, having an area density less than 0.35 lb/ft<sup>2</sup>.

34. An automobile body panel according to claim 27, said heat shield having an area density less than 0.35 lb/ft<sup>2</sup>.

35. A heat shield according to claim 1, said heat shield being internally damped against vibration.

36. An automobile body panel according to claim 27, said heat shield being internally damped against vibration.